

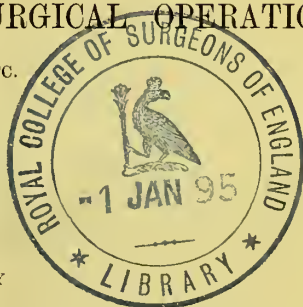
# HOSPITALISM:

ITS EFFECTS

ON

THE RESULTS OF SURGICAL OPERATIONS,

ETC.



BY

SIR J. Y. SIMPSON, BART., M.D., D.C.L..

PROFESSOR OF MEDICINE AND MIDWIFERY, IN THE UNIVERSITY OF EDINBURGH.

PART II.

2098 COUNTRY AMPUTATIONS;

2089 HOSPITAL AMPUTATIONS.

EDINBURGH: PRINTED BY OLIVER AND BOYD.

---

MDCCCLXIX.

REPRINTED FROM THE EDINBURGH MEDICAL JOURNAL FOR JUNE 1869.

# HOSPITALISM AND ITS EFFECTS.

## PART II.

---

### CHAPTER III.—ON SOME MINOR POINTS PERTAINING TO THE COLLECTION OF AMPUTATIONS IN TABLE I.

MY chief object in collecting the 2000 and odd cases of amputation recorded in Table I. was to ascertain what was the mortality in private country and provincial practice of the four major amputations of the limbs<sup>1</sup> when taken as a class of operations,—when taken as individual operations,—and when performed for the effects of injury or for the effects of disease. As already stated, however, there was added to the schedule which was intended to elicit these leading data, a vacant space, headed “Remarks,” under the belief that valuable observations of various kinds might be appended by some of the reporters. In this hope I have not been disappointed. Perhaps I might have added several more special and direct questions on various minor matters; but I avoided doing so under the conviction that, if I asked too much or too many things, I should be liable to get the primary and simple points regarding the mortality, buried and lost in points of infinitely less importance; or, indeed, receive no answer at all.

In the present and following chapters I shall throw together some of the more interesting items of information contained in these “Remarks.”

#### *Double Amputations in twenty-three of the Cases.*

The cases enumerated in Table I. amount to 2098. This is the number of patients operated upon; but the actual number of amputations performed was greater, being 2122 in all. For in twenty-three instances of severe injuries, involving two extremities,

<sup>1</sup> Let it be here explicitly noted, that the present collection of limb-amputations in country and in hospital practice is limited to the *four* amputations through the bones of the thigh, leg, arm, and forearm, and does not include any of the other *six* amputations of the limbs through the joints, viz., the hip, knee, ankle, shoulder, elbow, and wrist joints. To have taken into the investigation disarticulations or amputations through the joints, would have complicated and extended the whole inquiry very greatly and very needlessly.

the patients were subjected to more than one amputation; as the thigh and leg, two legs, etc. Sometimes, in the schedules, as they were returned to me, these double amputations were entered as two amputations; but in accordance with the practice followed, I believe, in most hospital returns, I have given in the table each double amputation as one case; entering it under the head of the greater of the two amputations that were performed, when the two amputations were on different parts of the two limbs. Several correspondents who have added few or no "remarks" have, if I may judge from the number of their primary or traumatic cases, possibly or probably met with additional double amputations, though they have not considered them of sufficient interest to report upon in their returns.<sup>1</sup>

TABLE II.—*Of the Results of Twenty-three Double Amputations after Complex Injuries.*

No. of Schedule.	Double Primary Amputations.	No. of Cases.	Deaths.
7	Both forearms, . . . . .	1	0
22	Both legs, . . . . .	1	0
24	Thigh and arm at shoulder-joint, . . . . .	1	0
31	Both arms, . . . . .	1	0
34	{ Thigh and arm, . . . . .	1	0
	{ Thigh and leg, . . . . .	1	1
43	Both forearms, . . . . .	1	0
44	Both legs, . . . . .	1	0
49	{ Both legs, . . . . .	1	0
	{ Leg and arm, . . . . .	1	0
59	Both legs, . . . . .	1	0
65	Both forearms, . . . . .	1	0
78	Thigh and leg, . . . . .	1	0
107	Arm and forearm, . . . . .	1	1
125	Both thighs, . . . . .	1	1
133	Both thighs, . . . . .	1	1
134	Thigh and arm, . . . . .	1	1
135	Both arms, . . . . .	1	0
184	Thigh and leg, . . . . .	1	1
200	Both forearms, . . . . .	1	0
344	{ Thigh and forearm, . . . . .	1	0
	{ Arm and forearm, . . . . .	1	0
	{ Both thighs, . . . . .	1	1
Total, . . . . .		23	7

The mortality among these cases of primary double amputations, viz., 7 deaths in 46 amputations, performed upon 23 individuals, is strikingly small, when we take into consideration the terrible character of the compound injuries under which the patients suffered.

<sup>1</sup> The three cases of double amputation in the Table occurred to Mr Hinton of Hinton. Mr Moodie of Stirling and Dr Thomson of Motherwell have each reported two double amputations.

In our large and metropolitan hospitals, as we shall see in the sequel, the mortality attendant upon *single* amputations, primary and secondary, is greater. And, in these hospitals, double amputations seem to be attended by a frightful mortality. Out of a list of the last 11 double primary amputations performed in the Edinburgh Infirmary, and furnished to me by Mr M'Dougall, 10 of the patients died. The case which survived was a double amputation through the knee-joints, and does not therefore properly belong to the present inquiry, as it excludes all operations *through* the joints.

Some of the double amputations are shown in the Table to be greatly more dangerous than others; those involving the thigh being apparently much the most perilous.

*Upper Extremities.*—Out of 4 double amputations in which both forearms were removed, all the 4 patients recovered; 2 other patients, in whom both arms were amputated, recovered also; as did 1 in whom the opposite arm and forearm were removed; and 1 only out of the 8 in whom the double amputations were confined to the upper extremities died. In this eighth and fatal case, the right arm and left forearm were amputated.

*Lower Extremities.*—In 4 cases both legs were amputated; all the patients survived. In a fifth the amputation of the leg and arm proved successful. In 10 cases in which amputation of the thigh formed one of the forms of dismemberment, 6 deaths occurred. In 1 the thigh and forearm, and in 2 the thigh and arm were amputated; all three recovered. In 3 cases a thigh and the opposite leg were amputated; 2 out of the 3 succumbed. In 3 cases both thighs were amputated; all 3 patients died.<sup>1</sup>

### *Age of the Patients.*

I originally sent out no query about the ages of the patients operated upon, because it seemed to be unnecessary. For there appeared no reason whatever for believing that the general average of ages of those submitted to amputation in country practice would differ in any important respect from the general

<sup>1</sup> In an annotation to his schedule, Mr Anderson of Castle-Douglas relates a case where a double amputation was performed by machinery, and not by the knife of the surgeon; and which is, therefore, not included in Table I. But this double amputation deserves to be recorded. "A girl," he states, "about ten years of age, amusing herself putting straws into a lint-mill, had her hands caught by the machine, and gradually drawn inwards, till stopped at the shoulders, when they were completely detached close to the shoulder-joints. There was no bleeding, although the arteries were seen on the surface of the wounds pulsating strongly. One sharp projecting piece of bone was removed by pliers. Nothing more was done, as the attempt to remove ragged pieces of muscle and skin produced such violent excitement in the girl,—it was before chloroform was known,—that we were compelled to desist. Wet rags were laid over the wounds; everything went on well; granulations sprang up and covered the ends of the bones; and in due time cicatrization was completed with so little assistance that, it may be said, the mill amputated the arms, and the *vis medicatrix naturæ* effected the cure of the stumps."

average of ages of those submitted to amputation in hospital practice. Some of my correspondents have incidentally given the ages of their patients. These ages vary from 1 up to 84 years. The youngest subject noted is an infant about twelve months old. The case occurred in the practice of Dr Livingston of Wishaw. The child's arm was smashed by a railway-waggon, and Dr Livingston was obliged to amputate the limb high up. The little patient did well for ten days, but ultimately sank. Several gentlemen speak of the amputations which they practised being in "old" or "very old" individuals, without specifying more particularly this state of advanced age. In others of these instances the age of the patients is specified, and the following Table shows the cases of this kind which I have found in the annotations of my correspondents :—

TABLE III.—*Result of Amputations by Country Practitioners on Patients of 70 years and upwards.*

No. of Schedule.	Age of Patient.	Special Amputation.		Recovered.	Died.
		For Injury.	For Disease.		
289	70 . . .	. .	Leg .	0	1
188	70 . . .	Arm .	. .	1	0
45	70 . . .	Leg .	. .	0	1
118	Above 70 . . .	. .	Thigh .	0	1
273	72 . . .	Arm .	. .	1	0
268	Above 72 . . .	. .	Thigh .	1	0
43	73 . . .	. .	Leg .	1	0
131	73 . . .	. .	Arm .	1	0
354	74 . . .	Leg .	. .	0	1
240	74 . . .	Leg .	. .	1	0
257	74 . . .	Arm .	. .	0	1
222	75 . . .	. .	Forearm .	1	0
359	75 . . .	Arm .	. .	1	0
43	77 . . .	. .	Leg .	0	1
295	78 . . .	Leg .	. .	1	0
144	Between 70 and 80	Forearm .	. .	1	0
106	80 . . .	Leg .	. .	1	0
27	Above 80 . . .	. .	Thigh .	0	1
117	" 80 . . .	. .	Leg .	1	0
141	82 . . .	. .	Thigh .	1	0
1	84 . . .	Thigh .	. .	1	0
17	84 . . .	. .	Thigh .	0	1
Total .				14	8

This mortality rate of 1 death in 2·7, or of 8 out of 22, is, as we shall see subsequently, not more than the rate of mortality in most of our large and metropolitan hospitals in patients of *all* ages; and consequently forms an amount of mortality much smaller than could be *à priori* expected in a set of patients operated upon after they had reached or passed the "threescore years and ten."



*Injuries and Diseases necessitating the Amputation.*

Though the causes leading to the amputations are often mentioned in the returns, I do not know that anything special can be adduced under this head.

In the traumatic or primary cases, the injuries noted are chiefly for railway and other accidents connected with mining, iron-works, and various descriptions of machinery. Some are the results of high falls; several, and particularly the amputations of the forearm, from gun-shot wounds, bursting of guns, etc. The unguarded country thrashing-machine is very often mentioned as the source of the mutilations that led to amputations in the upper extremity. The super-vention of gangrene following upon injuries, such as in compound fractures, etc., is repeatedly mentioned as the reason for having had, sooner or later after the accidents, recourse to amputation. In two or three cases, suppuration of the knee-joint following upon its puncture or injury, is noted as the cause leading to the operation.

Among the pathological series, or amputations for disease, I find annotated most frequently diseases of the joints and bones. In various instances, the existence of cancerous deposits and ulcers in the amputated portion of limb, of fungus hæmatodes, of tumours (one lived for twenty years after amputation<sup>1</sup>), of burns and their effects, of frostbites, of dry or senile gangrene, led to the operation. In one case it was deemed necessary to stay the bleeding from a popliteal aneurism; in another instance it was had recourse to in the faint hope of arresting tetanus. The patient, in the practice of Mr Boyle of Newquay, had a compound fracture of the leg, and progressed favourably for twelve days, when symptoms of tetanus supervened. Amputation was then adopted as a last resource. Death took place sixteen hours afterwards.

#### CHAPTER IV.—CAUSES OF DEATH IN THE FATAL CASES OF AMPUTATION.

The primary questions of the actual death-rate—whether high or low—attendant upon all the four major amputations of the limbs, collectively and individually,—and attendant upon these same amputations when performed for the results of injury and for the results of disease, form the special objects of our present investigation; and the whole inquiry has been conducted more particularly with a view of ascertaining the relative effects of place or locality, or of the conditions of hospitalism and the conditions of private rural practice upon the results.

My object has been to ascertain as far as possible the differences, if any, in the death-rate of the major amputations under the

<sup>1</sup> It was a case of amputation of the thigh, in the practice of Dr Falla of Jedburgh. The tumour was fourteen pounds in weight, extended from the knee to the ankle, was of a fatty-like structure internally, and “had a bleeding fungus of nearly five inches in diameter” on a portion of its surface. The man (writes Dr Falla) is in perfect health now—twenty years after the operation.

different circumstances last alluded to. It does not come within the scope of the present inquiry to push the investigation into other more minute matters, such as the modes of performing the amputations by the flap or circular or ovoid method, the modes of arresting the hæmorrhage, or the modes of dressing the stump, etc., or the effects of age, sex, season, etc., upon the results. Nor does the pathological cause or causes of death, in the cases which ended fatally, form in any direct way a special object in our inquiry. But as few or no data on this last point exist in reference to amputations in rural practice, perhaps the following particulars may interest some readers:—

Out of the 227 deaths tabulated in Chapter II., the apparent causes of the fatal issue have been returned in above 160 of the cases as follows:—

I. *Shock*.—This is entered as the most frequent cause of death; the patient sometimes dying of it upon the operating table; or within a few hours; or within a day or two. In some cases the shock from the injury and the attendant hæmorrhage itself is mentioned as being so severe as to offer but a very forlorn hope for the success of the amputation. “Shock” is returned as the cause of death in 63 cases, including 36 amputations of the thigh, 21 of the leg, and 6 of the arm. Of these 63 cases, 56 were amputations for the results of injury, and 7 for the results of disease.

II. *Exhaustion* is returned as the cause of death in 28 cases, viz., in 19 amputations of the thigh, and 9 of the leg. Of the 28 amputations ending ultimately after a few days, and sometimes after weeks, in alleged “exhaustion,” 13 were primary and 15 secondary amputations. In some, the exhaustion is spoken of as combined with delirium tremens.

III. *Pyæmia* is described as the pathological cause of death in 8 cases—all traumatic; viz., in 5 amputations of the thigh and in 3 of the leg for injury or its consequences. Perhaps some surgeons would have considered a few of the cases entered under other heads as referable to forms of pyæmia.

IV. *Gangrene of the stump* is returned as the cause of death in 18 cases; 12 of them primary and 6 of them secondary amputations. In several it existed before amputation. Of the 18 cases, 8 were amputations of the thigh, and 9 were amputations of the leg. In the only 2 amputations of the forearm that were fatal, gangrene is given as the cause of death.

V. *Secondary hæmorrhage* is referred to as having produced the fatal issue in 9 cases, viz., in 4 amputations of the thigh, and 5 of the leg. Of these 9 amputations, 4 were primary or traumatic, and 5 were secondary or for disease. In 1 of the thigh-amputations, the reporter, Mr Edwards of Wiveliscombe, observes, “Death was caused by hæmorrhage before and after operation, the case being one of fungus hæmatodes.” This was the only unsuccessful case in 18 limb-amputations performed by Mr Edwards.



VI. *Tetanus*.—From it 11 deaths resulted, all of them, with one exception, after amputations for injury; 2 of them in the practice of one surgeon. Of the 11 deaths, 4 were after amputations of the thigh, 6 after amputations of the leg, and 1 after amputation of the arm.

VII. *Internal Injuries*.—In a considerable number of the cases entered in the Table as fatal after primary amputations, the alleged cause of death is some injury or injuries, generally internal, received at the same time with the injuries to the limb that necessitated its amputation. In 13 of these cases, 7 were amputations of the thigh, 4 of the leg, and 2 of the arm. The coexistent internal lesions returned as the causes of death were in different cases injuries of the brain, lungs, bladder, fractures of the skull, ribs, etc.<sup>1</sup>

VIII. *Miscellaneous Causes*.—Of chest affections returned as causes of death are several inflammatory complications, as 4 cases of fatal pneumonia, 3 of bronchitis, 2 of pleurisy, and 1 of hydrothorax. Pulmonary phthisis is entered as the cause of death in 7 or 8 patients. Gastric irritation of several weeks' duration after the amputation, and chronic and acute diarrhœa, are reported as the causes of death in 3 or 4 cases; convulsions in 2 or 3 others; encephalitis in 1; hectic fever and suppurations in 2 more; and a large abscess of the neck in a third; erysipelas formed a fatal complication in 1 case; 1 died of scarlatina; 1 in the eighteenth day after operation, of an attack of influenza; 1 some weeks after, of

<sup>1</sup> *Internal Injuries in some of the fatal Primary Amputations*.—Take, for example, the following extracts as illustrations of the remarks in the text:—"The death in the primary arm case cannot fairly be put down as a death from amputation, as the person was otherwise severely injured, and actually died of brain concussion and compression a few hours after the operation."—*Mr Troup of Auchtermuchty*. "The case of fatal primary amputation of the leg was one of railway smash, and was complicated with fracture of the skull and concussion of the brain. The cause of death was encephalitis."—*Dr Drew of Chapelton*. "In the fatal primary amputation, the patient really died in consequence of compression of the brain from extravasated blood, having a fracture of the skull."—*Mr Grindrod of New Mills*. In one fatal case out of nine amputations, "the one death was not the result of the operation, but rather of the extent and severity of the injury which rendered the operation necessary."—*Mr Baillie of Markinch*. In a fatal thigh-amputation, the patient "died in consequence of internal injuries."—*Dr Paterson of Bridge-of-Allan*. In two fatal primary amputations of the thigh and leg, "the deaths resulted directly from hæmorrhage prior to the operation, and, therefore, it is scarcely fair to count them."—*Mr Eames of Pulham*. "Hardly expected my patient to recover from his amputation, in consequence of the severe nature of his injury and the loss of blood; for he had his leg completely severed at the knee-joint by the friction of a heavy pit-chain, and lost a great amount of blood before I saw him."—*Mr Dow of Dunfermline*. "Out of fourteen cases, with two deaths, my leg case was fatal from injury to the bladder, and I had a shoulder-joint amputation which was fatal from injuries to the lungs."—*Dr Maclatchy of Kilmarnock*. "The death after amputation of the thigh occurred in the case of a man who fell to the ground from a great height. He sustained a bad compound fracture of the thigh, and was, besides, much injured internally, surviving the operation only 48 hours. I do not consider his death fairly assignable to the operation. Several of his ribs were broken, his lungs injured, and general emphysema supervened."—*Dr Steele of Montrose*; etc., etc., etc.

general anasarca, the stump being "perfectly healed before death," etc.

*Date of Death.*—In some returns of amputations which have been published in this and in other countries, it has been sometimes held justifiable to enter a case as successful when the patient survived the operation above a certain limited period, as four, five, or six weeks. I have, however, entered the cases as fatal, even when death did not take place for a longer period, and the pathological cause of it was not directly connected with the operation as in the last case mentioned in the preceding paragraph. Or take phthisis pulmonalis, as an example. In relation to one of his thigh-amputations for chronic disease of the knee, Dr Gavin of Strichen remarks, "Death took place about a month after amputation. It was really," he adds, "a case of death from pulmonary consumption; for at no time were there any symptoms directly caused by the operation that produced any anxiety." Out of other instances in which tubercular phthisis is returned as the cause of death after amputation, there is one of amputation of the thigh by Mr Day of Harlow, where the patient died after six weeks; another of thigh-amputation by Mr Ronald of Ayr, where the patient died two months after the operation; and a third by Dr Henry of Arroquhar, where death did not supervene till three months. But I have placed all these instances as amputations followed by death, though the date of death and the cause of it might possibly, in the opinion of some, have taken them and other like cases out of the category of fatal issues. Again, Dr Forrest of Motherwell, in reporting 13 cases of amputation which he had performed, remarks, in reference to one fatal primary leg-amputation,—"*The amputation did well*, but the thigh was severely bruised, deep-seated abscess formed, and he died from exhaustion at the end of four months." Perhaps in respect to this and similar cases it might be argued that, as "*the amputation did well*," and was not apparently the pathological cause of the patient's death, the death should not be entered as the result of the amputation. I have followed, however, in this and other examples the safer statistical rule of holding such cases to be amputations ending in death; as is done, I believe, in those hospital returns that are the most to be relied upon for their accuracy.

#### CHAPTER V.—CLASSES OF PATIENTS ON WHOM THE TWO THOUSAND AMPUTATIONS WERE PERFORMED; AND THE GENERAL CHARACTER OF THEIR HABITATIONS.

In the schedules sent out, in addition to the results of the four amputations of the limbs, I stated that it would be considered an additional favour if my correspondents would inform me whether their cases were in persons belonging to the upper, the middle, or the lower classes, and whether the character of their habitations appeared to influence the chances of death or recovery.

A very few of the two thousand patients—not above half-a-dozen—are reported to me as belonging to the upper classes; and a much larger number—perhaps eight or ten per cent. of the whole—as belonging to the middle classes of society. But the great mass of those operated upon were artisans, labourers, farm-servants, miners, iron-workers, quarrymen, etc., or some members of their families,—in short, individuals belonging to such a class as, in our large towns and cities, would be generally sent into hospitals.

The house accommodation of this latter class, upon whom the amputations were thus chiefly or almost entirely performed, was not such as most hospital surgeons would deem eligible. In many cases the chamber in which the patient was laid, even when small, was no doubt clean, comfortable, and tidy; but in most the bed and other accommodation was sufficiently stinted and limited. A few extracts, however, from the notes of some of my correspondents will illustrate this observation better than any didactic statement.

A large number of the cases of amputation were performed at their own houses on workers in mines, iron-factories, etc. Their house accommodation is, as a rule, usually rather poor; but the general free ventilation of their cottages and hovels more than compensates for their other deficiencies. Thus, Dr Stewart of Kirkintilloch, in sending me a list of 25 limb-amputations which he had performed, with 24 recoveries and one death, remarks:—"All my operations, except one, were among miners. Their dwellings were composed of *two* rooms, but the doors were always kept open. The only death in my surgical practice (being one in ten primary amputations of the thigh) was in a fisherwoman, who met with a railway accident. She died of bronchitis ten days after the operation. In the operations for the scrofulous diseases of joints, I found that the patients immediately began to improve after the operation was performed, and all made good recoveries." In his schedule, Dr Boyd of Slamannan observes:—"In most of my cases the domestic accommodation has been of the most defective nature, but country air and thorough ventilation from open doors and constant fires atone for many other deficiencies. . . . I would consider it," he adds, "my duty to undertake a formidable operation in a *colliery row* rather than send in the patient to the best-conducted hospital, notwithstanding the immeasurable superiority of diagnostic skill and operative dexterity to be had there." Out of 6 limb-amputations, Dr Boyd has lost only one, viz., a primary thigh-amputation in a stoker, for a severe railway accident. He died of shock in two hours. Writing from the same locality, and practising, I believe, among the same class of patients, Mr Waddell reports to me 10 cases of primary amputations of the limbs, all of them successful. One of my correspondents, Mr Cribbes of Gorebridge, after speaking of all wounds in his district,—and the wounds are many among his colliery patients,—healing, as regards both time and results, rapidly and satisfactorily, states:—"In none



of them have I known erysipelas or fatal results ensue;" and he adds, "these remarks apply wholly to the mining population, who are, after all, blest with nothing approaching to sanitary measures excepting the free blast of heaven, which whistles merrily through their ill-conditioned dwellings."

Some of the patients subjected to limb-amputation were located in habitations still more stunted and squalid than the cottage of the collier and iron-worker. In many rural villages and towns the poorer types of mechanics and their families all live in a house of a single room; and the country ploughman and labourer and their families are often similarly situated. In sending me a report of seven cases of amputation of the limbs, with one death,<sup>1</sup> Dr Lindsay of Lesmahagow remarks:—"The whole of the cases were in persons belonging to the lower classes, and were treated in small houses, most of them of *one* apartment." "The six amputations performed by me," writes Dr Jeffray of Ayton, "have all been in persons belonging to the lower classes, and all for injury. All the operations, with one exception, were performed in dwellings where there was only one apartment, into which all inquiring about the patient were freely admitted, and where there was no great ventilation. One of the operations—amputation of the leg—was performed in a hut upon the North British Railway, when in course of formation, and the end of the table upon which the patient was laid had to be brought to the door of the hut in order that I might have sufficient light." In a case in which Mr Bloxham of Hales-Owen was amputating the thigh, "in consequence of aneurism of the popliteal artery, which had been opened by a quack," the patient was living "in a den about six feet square, not high enough to stand upright in, and two farthing dips afforded the only light." The patient recovered. Describing the accommodation in a case of amputation of the thigh, Mr Cade of Spondon remarks, "The operation was performed in a miserable hovel, for it would be hardly fit to call such a place a house,—in a miserable bed; and yet the case did very well." In reporting to me three cases of primary limb-amputation—two of the thigh, and one of the leg—which all succeeded, Mr Girvan of Maybole says, "In each case there was but one apartment for the whole members of the family to live, cook, eat, and sleep in." Mr Balding of Rayston, in forwarding the results of two cases—one of them amputation of the leg, and the other of the thigh—strongly points out what the differences between healthy and unhealthy cottages may lead to:—"The two cases of amputation," says he, "were both performed in cottages. The case of amputation of the leg was in a dirty and unhealthy cottage, sur-

<sup>1</sup> The fatal case was in a case of thigh-amputation. "The operation," Dr Lindsay writes, "was undertaken with scarcely any hope of success. It was a case of compound fracture,—not a severe one,—which resulted in gangrene a few days after the accident, apparently from some defect of constitution. Although a line of demarcation had formed in the leg, there was great infiltration of the tissues upwards even into the pelvis."

rounded by every description of filth. There was no attempt at union in the wound, the flaps sloughed, and the patient died nine days after the operation. The other case, that of amputation of the thigh, was performed in a clean and healthily-situated cottage. The patient's recovery was more rapid than was ever witnessed in any hospital. At the expiration of a fortnight he may be described as having been almost well."

Dr Irving of Pitlochrie has performed amputation of the limbs in 12 cases, and makes an observation upon the houses in his Highland district, which seems to me of importance. The only case of the 12 that died was an old drunkard of 84 years of age. "Excepting this instance," Dr Irving writes, "I have lost no cases after any capital operations. The 12 amputations were all in the lower classes. Some of their houses were small and dark, but as the walls were badly built, and the roofs thatched, the ventilation was therefore good." Dr Irving believes that the introduction into Highland and other districts of the close slated instead of the open thatched roof, is proving unsanitary where the families are not yet educated up to the necessary amount of tidiness and cleanliness.

In addition to the occasionally wretched house accommodation of the patients, their beds were sometimes of the worst construction in a sanitary point of view, being made on the old plan of building them closely off, with an inclosure or box of wood all around, and alike on the sides and top. Dr Johnston writes me, that in the earlier years of his practice, and before becoming connected with the Montrose Hospital, he performed several limb-amputations in the country. "All the patients," he says, "belonged to the labouring class, and were treated in the obnoxious box-bed which is in universal use among this class in the rural parts of Forfar and Kincardineshire."<sup>1</sup>

In reporting to me 12 cases of amputation of the limbs which he has performed, Dr Hamilton of Dalry makes a remark, which is, I think, highly worthy of citation. "It has long," he states, "been my belief that the success of the treatment of amputation and of compound fractures was greater in private than in hospital practice, even when the comforts and surroundings were totally unequal to those of the Hospital. I believe," Dr Hamilton adds, "that *isolation has much to do with it.*" I doubt not that the segregation of the sick from the sick—every diseased man being a focus of more or less danger to the diseased around him—is a principle of no small moment and value.

<sup>1</sup> Of the 11 patients, 2 died from shock shortly after primary amputations, one being a woman of almost 80 years of age, with comminuted fracture of the leg and compound dislocation of the ankle; and the second a lunatic, in whom the arm was smashed and destroyed.



## CHAPTER VI.—SEVERITY OF SOME OF THE CASES THAT RECOVERED.

It has been sometimes maintained that all the most severe and formidable cases, and classes of cases, of injury and disease among the country poor are more likely to be sent into hospitals than treated at home; and that this circumstance alone specially accounts for the higher hospital danger and mortality in limb-amputations.

The most dangerous class of amputations of the limbs consists of primary amputations required for injury; and the most perilous of all amputations in the continuity of the bones is amputation of the thigh for injuries inflicted by railways, mining, machinery, etc. In his very able work on Surgery, Professor Erichsen observes:—"It is more especially primary amputations of the lower extremities, and particularly those of the *thigh*, that are attended by very fatal results. Of the 46 cases of primary amputation of the thigh recorded by Malgaigne, 34 perished. And of 24 cases recorded by South, Lawrie, and Peacock as occurring at St Thomas's Hospital, the Glasgow Infirmary, and the Edinburgh Infirmary, every one proved fatal. This similarity of result," Mr Erichsen adds, "occurring in different institutions, shows clearly that this operation is one of *the* most fatal in surgery, and that the great mortality attending it is inherent to it, and not dependent upon local or accidental circumstances."

According, therefore, to the theory that the cases requiring the most formidable and fatal operations are generally, if not systematically, forwarded from the country into the city hospital, primary amputations of the thigh should be found in far greater numbers in the returns of large city hospitals than in rural practice. Is it so?

Among the 2098 cases of limb-amputations collated in Table I. from rural and provincial practice, there are 313 cases of primary amputation of the thigh, with 80 deaths; or very nearly 1 death in every 4 operated upon.

Among 2089 cases of limb-amputations collated in Table XI. (see the sequel) from eleven large and metropolitan hospitals, there are 304 cases of primary amputation of the thigh, with 196 deaths; or 1 death in every 1·5 operated upon.

The proportionate number, therefore, of primary amputations of the thigh, is thus as nearly as possible the same in country practice as in large hospital practice—being 14·8 per cent. of the whole in the first, and 14·5 per cent. of the whole in the last; but the mortality attendant upon the operation is more than *twice and a half* as high in large hospital practice as it is in country practice.

Injuries, indeed, so serious as to require such a grave operation as amputation of the thigh or leg ought, perhaps, as a general rule, not to be forwarded from the country into a city infirmary. Patients so damaged and shattered would have a far better chance of life if

they were operated upon and kept in a railway shed, or in a country hovel, than by being carried to a distance into the richest and best conducted hospital. Chance has sometimes preached this lesson. Thus Dr Carmichael of Burntisland—a town lying on the opposite side of the Forth, at a distance of some seven miles from the Edinburgh Infirmary—states to me that since he began to practise there, three years ago, he had sent 6 cases of severe injuries requiring amputation of the limbs to the Edinburgh Hospitals. All the 6 died. In the last case, however, which happened, the patient was a middle-aged man of not a very robust constitution, who received such very severe injuries of both legs that it was deemed utterly hopeless to attempt to carry him as far as Edinburgh. Dr Carmichael, consequently, retained the man in comparatively poor accommodation at Burntisland, and performed upon him the necessary double amputation of one thigh and the opposite leg. He made an excellent recovery.

We have already in Table II. entered 16 cases of compound amputations of the limbs that recovered in despite of the tremendous severity of the accidents and injuries that led to the dire necessity, in each of them, of a double amputation.

In some of the remarks forwarded to me along with the schedules, the severe and desperate character of the injuries requiring the primary amputations is incidentally alluded to. Thus, Dr Lawrence of Cumnock, who has performed 20 amputations of the limbs without a death—5 for disease, and 15 for injury—remarks, “About one-third of these cases were so bad that I thought it was *impossible* they could recover.” Six of his cases were amputations of the thigh.

Dr Cullen of Airdrie, who has performed, without a death, 10 primary amputations of the thigh, and 17 primary amputations of the leg, among an iron-working and colliery population, says that the deplorable severity of some of the mining injuries was probably much greater in the past than it will be in the future, in consequence of the protection now afforded to the men by the Mines’ Inspection Act. But accidents and mutilations of an appalling type still occur in some localities. Mr Davis of Aberdare, who has with his own hand performed 22 primary amputations of the thigh, and 23 primary amputations of the leg, adds that 7 of the thigh-amputations were for one terrific form of accident, viz., compound dislocation of the knee—an accident which seems to be the result, in his district, of the mode in which the workmen are in the habit, by applying their backs, of staying the loaded and descending trucks in the mines.

Various instances have been recounted to me of the desperate and complicated nature of some of the injuries from which the amputated patients recovered. As examples, let me cite from Dr Kirk of Bathgate, the two following illustrative cases of injury and recovery in miners. Whilst working in the pit, above half a ton

of solid rock fell upon one of these men. This enormous mass required to be broken up before the man could be removed from beneath it. He had the following series of injuries: 1. Fracture of the left thigh-bone; 2. Compound comminuted fracture of the right leg, for which amputation was performed below the knee-joint; 3. Dislocation of the right hip-joint; 4. Lacerated wound of the perineum, extending into the right iliac fossa; and, 5. Compound comminuted fracture of the metacarpal bones of the left hand. He had afterwards pyæmia, with tympanitis; and a large abscess formed over the dislocated thigh. Under the kind and able care of Dr Kirk, this patient recovered; was enabled to get about in three months; and now works in the pit every day. To quarry off the block of rock which fell upon him, required two or three hours' work on the part of his comrades; and he was subsequently removed from the pit-mouth in a cart to a room two miles distant. Dr Kirk further informs me that he treated shortly afterwards in the same room another miner from the same pit, upon whom a mass of rock had also fallen. It entirely comminuted and ground the bones of one knee-joint, so as to necessitate the amputation of the thigh; and his head and face were very severely injured. This miner was a debilitated man, advanced beyond fifty, addicted to hard drinking, and the subject of a chronic bronchitis. Yet notwithstanding his age and his weakness, his drunken habits, and his troublesome cough, he recovered rapidly, and without a drawback. Would these two poor fellows have had much or any chance of escape, if, instead of being treated at home, they had been carried away into a distant city hospital?

The preceding remarks on the severity of some of the cases that recovered, refer chiefly or entirely to primary amputations, or to those required for injuries or their results. They tend to show that these primary amputations in country practice were necessitated by as formidable injuries as could well be met with in hospital practice. But in the country, secondary amputations, or those for disease, are also in many instances necessitated by as unpromising morbid local lesions and morbid constitutional states as are met with in large hospitals. A few of the secondary amputations entered in Table I. had been, indeed, previously despaired of when the patients were the inmates of hospitals, and yet afterwards proved successful operations in the country. Thus, for example, in some notes on his amputations, Mr Breach of Aston-up-Thorpe observes:—"All the cases proved successful. One (a thigh-amputation) was turned out of the — Infirmary as incurable, the surgeon fearing to operate, as the patient appeared to be in the last stage of hectic, from ulceration of the cartilages of the knee-joints and caries of the femur. The patient begged of me to operate to relieve her of her extreme pain. I reluctantly yielded to her request. About the third or fourth day erysipelas of the stump took place. Betimes a ring of bone ex-



foliated, and she made henceforward a rapid recovery. She is now in robust health,—it being just nine years since the operation.” In speaking of another thigh-amputation, Mr Brookes of Shaldon observes:—“The patient was a sailor in the Royal Navy, and was brought home at his own request from — Hospital. The case was one of diseased knee, and the operation was performed with little hope of success. It was, however, the only chance, and all went on well.” Dr Corbett of Orsett writes me in relation to two thigh-amputations which he has successfully performed, that one of his cases was in a labouring man, aged 72, who “had been in the — Hospital for some months, and was discharged to die, as there was a difference of opinion as to the possibility of recovery if an operation was performed.” In reference to a case of amputation of the leg, Mr Hallett of Axminster remarks that “the operation on an old sailor was performed on account of caries of the os calcis, and exostosis of the lower end of the tibia and fibula, of many years’ standing. He had been sent to an hospital; but the surgeons declined operating, fearing that, as his health was such, he would sink under its effects. He, however, recovered without a single bad symptom, and lived in comfort for many years afterwards.”<sup>1</sup>

Occasionally country patients, by the time that they require to be the subjects of secondary or pathological amputations, are already so utterly sunk and debilitated as to be entirely incapable of being moved off to an hospital; and yet sometimes make good recoveries when the operation is had recourse to at home. Dr Pairman of Biggar has sent me reports of two cases, in regard to which he observes: “Both were in the humble ranks of life, and operated on by me because reduced to a condition of such extreme weakness that they could not be removed to an hospital. Both, however, recovered admirably. One of them was almost hopeless from prostration before the operation, and, as I think, would almost certainly have died in any hospital.”

The patient, before at last agreeing to amputation, may have lapsed down into the very lowest stage of weakness and almost of hopelessness—a result which, if I may judge from the remarks sent to me, not unfrequently occurs in country practice. Thus, Mr Lawrence of Mintlaw states, in reference to an amputation of the thigh for disease which was performed by him, that the patient “had long laboured under disease of the knee-joint, and was so

<sup>1</sup> In some of the amputations for disease, there was a remarkable succession of operations. Thus, Mr George of Keith, in commenting upon one of his cases of amputation of the leg for disease of the ankle-joint, remarks that the patient, a farm-servant aged 57, suffered a year afterwards so severely from affection of the knee-joint, that “it was necessary to remove the thigh about the middle. Eighteen months after the removal of the thigh, his right hand and wrist became diseased, for which he had the forearm amputated. Previously to the removal of any of his limbs, the operation of lithotomy was performed upon him in Elgin Hospital; and he died, three years after the last amputation, of disease of the bladder.”

weak and attenuated that he could *not* be moved even to a table for the operation; but his recovery was rapid, and he got very stout."

Several correspondents speak of the recovery of some of their patients in the country<sup>1</sup> from secondary amputations, as conditions that scarcely could have been realized if these same patients had been the inmates of city hospitals. Mr Haig of Airth, for example, in reporting to me several successful cases of amputation, remarks, in regard to three of his six secondary operations, "I feel certain that, owing to the great debility induced by the discharges from the knee and elbow joints, a satisfactory result could *not* have been looked for if the patients had been confined in the wards even of the best of hospitals." In reference to four cases of secondary amputation in his practice, in all of which the state of debility of his patients was complicated and extreme, and the cottage accommodation most defective, Mr Blackburn of Barnsley asserts, "All recovered; yet my own belief is, that every case would have died if removed to an hospital."

Many correspondents have casually, and yet so strongly, expressed in a similar spirit the results of their experience as to amputations and other operations succeeding much better in country than in hospital practice, that perhaps the collation of a few such opinions may be interesting.

## CHAPTER VII.—OPINIONS AS TO AMPUTATIONS, ETC., SUCCEEDING BETTER IN PRIVATE COUNTRY THAN IN PUBLIC HOSPITAL PRACTICE.

There are various reasons why cases of disease or injury among the poor in the country requiring amputation are sent off to city hospitals. Enumerating these reasons, in a late letter to me, Dr Whitelaw of Kirkintilloch remarks:—"In my opinion, country patients are sent to the city hospital, *first*, by their relatives, because they cannot give them food at home; because they cannot pay for continued surgical attendance; because they have great faith in the head doctor, from whom there is no appeal; and because they know nothing of the perils of hospital pyæmia, erysipelas, etc.; *secondly*, they are sent by the country practitioners, because the accommodation, nursing, and resources at home are frequently quite inadequate; because once away to the hospital, the patient, probably a poor

<sup>1</sup> While this sheet was printing, Mr Harper of Holbeach has sent me the results of above 80 operations which he has performed in country practice, with a view of showing their relative safety in the country. Among these 12 were limb-amputations, 1 died; 4 were lithotomies, 1 died; and 7 were cases of strangulated hernia, 2 died. Only these four deaths occurred; and the recoveries included cases of lithotrity, of excision of tumours, of removal of portions of lower jaw, of amputation of mamma, extravasation of urine, amputations of the hand, fingers, etc., etc.



man, is off the doctor's mind, and his maintenance does not longer concern either his employers or the parochial board; and because, if the case turn out badly in the hospital, the tongues of the village gossips cannot reflect on the doctor,<sup>2</sup> for the patient had the best of skill.<sup>3</sup> Yet it is my conviction," adds Dr Whitelaw, "that ordinary amputations and compound fractures would result in more numerous and more satisfactory recoveries, if treated in the country with fair skill, than if sent to a city hospital." "As surgeon," observes Mr Garman of Wednesbury, "to large iron-works and collieries, I may be perhaps allowed to add, that compound fractures and other formidable surgical lesions appear to do better in the squalid homes of the patients, although of course suffering great deprivation and inconvenience, than under hospital care. My partner and myself have long made it a rule not to send any formidable accidents to the hospital if possible. The cases we send are for the most part simple fractures, and chronic sequences of accidents." Mr Carter of Pewsey states: "All my cases of amputation occurred in my pauper practice, the patients being of the lowest class of an agricultural population. But my undoubted experience has ever been, that the poor recover much more readily at their own houses than from the best of treatment elsewhere." "I can give," avers Mr Wilson of Alton, "my testimony in favour of operations being performed among the poor at their own houses; and there are few cottages indeed in the south of England in which a free current of air may not be obtained." Dr Monckton of Rugeley has sent me a note of the results of 6 amputations and 80 various surgical operations which he has performed. "Among all these," he writes, "the primary amputation through the thigh is the only case which had a fatal result, whereas I remember being shocked as a student to see operations performed in a London hospital for comparatively small ailments or deformities, which were often followed speedily by a fatal result from pyæmia, erysipelas, etc.; and to this day I hear students remark upon the same unfavourable issue to small operations most ably performed by the first surgeons of the land." "Having," observes Mr Cann of Dawlish, "been house-surgeon at Guy's Hospital, London, I can, without hesitation, pronounce in favour of operations being done in private houses." "I have had," says Dr Guppy of Falmouth, "many compound fractures among our sailors and dock-labourers, and my opinion is that the mortality from the graver operations and injuries is *much* less in private and country practice than in hospitals." Mr Hardy of Byer's Green, Willington, in sending a report of a series of limb-amputations, writes: "I have been long of opinion that severe accidents in the country are more likely to do well than when they are sent to an hospital, and I have never hesitated to express this opinion; for, living in a colliery district, where severe injuries often occur, I have found them to do better in their own houses than when sent away to an

hospital, and consequently I have been very chary in even advising the removal of such parties. Most of the cases of amputation which I have recorded have been caused by railway accidents. All the patients suffered from shock, and the deaths recorded have been from that cause; none from symptoms of blood-poisoning." In the same spirit Dr Thomson of Motherwell observes, "My experience is against sending any case to hospital that can be treated at home. I have only sent for years past lodgers, or those having no house accommodation." "I have always," writes Dr Loudon of Hamilton, "studied to keep the patients in their own homes when their means would admit of it, and have only sent those cases to hospital when parties refuse to admit them, as in the case of lodgers."

I might easily multiply similar extracts, but it seems unnecessary. Let me add, however, one remark in relation to the fixed belief with many city and hospital surgeons, that almost all severe cases of injury and disease likely to require amputation are forwarded by the rural practitioner to the city hospital. The great mass of cases of country limb-amputations which I have collected, affords in itself a strong answer to this allegation. Besides, in distant districts the removal of severely injured or diseased patients for amputation to city hospitals is a matter of impossibility. And where the practice is possible, it is often not at all followed. From the medical gentlemen of Airdrie, for example, and its surrounding villages, situated within a few miles of the Royal Infirmary of Glasgow, I have received returns of about one hundred and fifty limb-amputations performed by them at their patients' own homes.

#### CHAPTER VIII.—EVIDENCE OF INCREASED SUCCESS IN AMPUTATIONS FROM INCREASED EXPERIENCE.

Out of the 2098 amputations of the thigh, leg, arm, and forearm, performed in private provincial and country practice, and entered in Table I., 226 of the patients died; or 1 in every 9·2, or 10·8 per cent. Of the 2098 amputations, 1382 were primary, traumatic, or performed for injuries or their results. Of these 1382 cases, 151 proved fatal; or 1 in 9 died, or 11 in the 100. On the other hand, 716 of the 2098 amputations were secondary, pathological, or for disease and its results; and of these 716 cases, 74 proved fatal; or 1 in every 9·6 died, or 10·3 in every 100.

Of the 374 gentlemen who have reported to me these 2098 cases, a large number have had little opportunity of becoming experienced by much practice in the performance of amputation. Many have only been called upon to have recourse to the amputating-knife once, twice, or thrice, in the whole course of their lives. But in all operations, the surgeon acquires accumulated dexterity and skill by the repetition of an operative proceeding which, like this,

involves a combination of manual and mental qualities. It is therefore natural to expect that those practitioners who have performed amputation with considerable frequency should be somewhat more successful in their results than those who have not had the same amount of actual experience. To test on this ground the relative success of the operation in the hands of those provincial and rural practitioners who had practised amputation comparatively seldom, with those who had practised it more frequently, I have taken out of Table I. the results of the operation as observable, 1st, in the experience of those medical men who had performed amputation rarely, as only once, or twice, or at most under half-a-dozen times; 2dly, in the experience of those medical men who had practised amputation six times or oftener; and, 3dly, in the experience of those medical men who had used the amputating-knife twelve times or oftener. These analytical results appear to me of no small interest, as showing that, if the rural practitioner had as much experience as the Hospital surgeon, his present great success over the Hospital surgeon would be greater still; and his proportion of deaths from the major amputations would be even less than what the general Table shows—of 1 death in every 9 patients operated upon.

FIRST, In the columns of Table I. are contained the results of 629 limb-amputations, performed by 255 practitioners who have operated less than six times; 72 of them having amputated in 1 case only, 82 in 2 cases, 36 in 3 cases, etc.

The following summary shows the mortality among the individuals operated upon in these 629 amputations:—

Their total number of cases was 629; of deaths, 85; or 1 in every 7·4 died, or 13·5 in every 100.

Total number of amputations for injury, 401; of deaths, 53; or 1 in every 7·2 died, or 13·2 per cent.

Total number of amputations for disease, 228; of deaths, 32; or 1 in every 7·1 died, or 14 per cent.

*Mortality of the Four Major Amputations for Injuries and for Diseases among 255 Practitioners who have amputated less than six times.*

Thigh	cases, 193; deaths, 44; or 1 in 4·4; or 22·7 per cent.
Leg	„ 178; „ 32; or 1 in 5·5; or 18·0 „
Arm	„ 134; „ 8; or 1 in 16·7; or 6·0 „
Forearm	„ 124; „ 1; or 1 in 124; or 0·8 „

SECONDLY, I find in Table I. that 119 gentlemen practising in the country and provinces have had occasion to perform the major amputations of the limbs six times or oftener, with the following consequences:—

Total number of cases, 1469; of deaths, 141; or 1 in every 10·4 died, or 9·5 in every 100.

Total number of amputations for injury, 983; deaths, 100; or 1 in every 9·8 died, or 10·1 in every 100.

Total number of amputations for disease, 468; deaths, 41; or 1 in every 11·8 died, or 8·7 in every 100.

*Mortality of the Four Major Amputations for Injuries and for Diseases among 119 Practitioners who have amputated six times or oftener.*

Thigh cases,	476;	deaths,	79;	or 1 in	6·0;	or 16·5 per cent.
Leg	„	440;	„	50;	or 1 in	8·8; or 11·3 „
Arm	„	299;	„	11;	or 1 in	27·1; or 3·6 „
Forearm	„	254;	„	1;	or 1 in	254; or 0·4 „

THIRDLY, The proportion of successful amputations becomes greater still when we analyze the results of those practitioners who have operated twelve times or oftener. In Table I. are to be found 37 returns in which the number of amputations performed by one practitioner was twelve or upwards. These 37 practitioners have had occasion to perform the four major amputations of the limbs upon 821 patients, with the following results:—

Total number of cases, 821; of deaths, 67; or 1 in every 12·2 died, or 8·1 in every 100.

Total number of amputations for injury, 561; deaths, 46; or 1 in every 12·2 died, or 8·2 in every 100.

Total number of amputations for disease, 260; deaths, 21; or 1 in every 12·4, or 8 in every 100.

*Mortality of the Four Major Amputations for Injuries and for Diseases among 37 Practitioners who have operated twelve times or oftener.*

Thigh cases,	260;	deaths,	35;	or 1 in	7·4;	or 13·4 per cent.
Leg	„	250;	„	25;	or 1 in	10; or 10·0 „
Arm	„	179;	„	6;	or 1 in	29·8; or 3·3 „
<sup>1</sup> Forearm	„	132;	„	1;	or 1 in	132; or 0·7 „

The preceding three summaries of results show—

1. That, up to a certain point at least, limb-amputations become more and more successful in the hands of rural and provincial practitioners in accordance with the experience which they have had of the operation.

2. That hence the country limb-amputations entered in Table I. would, in all probability, have shown a still higher rate of success than they do present, if they had been all performed by men who—

<sup>1</sup> There are only 2 deaths under this heading in the whole Tables, 1 of which happens to be in this class, and thus alters the proportion so as to make it look worse than in the other Tables.



like city hospital surgeons—were by experience accustomed to the operation. And,

3. That the three successive summaries show how, with increased experience, there occurs not merely an increased scale of success in limb-amputations taken as a whole, but also in the different limb-amputations taken individually. Thus, for example, amputations of the thigh are lost among the three classes of practitioners in correspondence with the amount of their experience in the following proportions: 22·7 per cent.; 16·5 per cent.; 13·4 per cent.; and so on with regard to the other special amputations.

#### CHAPTER IX.—ON THE RESULTS OF LIMB-AMPUTATIONS IN PRIVATE PRACTICE IN OTHER COUNTRIES.

The statistics of limb-amputations in country practice collated in Chapter II. are altogether derived from the experience of surgeons living in the rural and provincial parts of England, Wales, and Scotland. No statistics of a similar kind have, so far as I know, been collected previously in Great Britain or elsewhere. But, a short time ago, I sent to my friend, Dr Nicolaysen of Christiania, a copy of the printed schedule which I had used here for collecting cases and their results; and he immediately began a series of similar inquiries regarding the danger and death-rate of amputations in Norway. The following tables, drawn up by himself, show the result of his investigations; and these are important in one respect. As far as they go, they confirm the conclusion that the average death-rate, after amputation of the limbs in private country practice, is about 1 in 9; and they show that the mortality is the same in Norway as in Great Britain.

##### *Results of 82 Amputations of the Thigh, Leg, Arm, and Forearm, in Private Practice in Norway.*

Thigh	cases, 29;	deaths, 5;	or 1 in 5·8;	or 17·24 per cent.
Leg	„ 30;	„ 2;	or 1 in 15;	or 6·6 „
Arm	„ 8;	„ 1;	or 1 in 8;	or 12·5 „
Forearm	„ 15;	„ 1;	or 1 in 15;	or 6·6 „

Total cases, 82; deaths, 9; or 1 in 9·0; or 10·9 per cent.

Of these amputations there were, *Primary or for Injury*,—

Thigh	cases, 8;	deaths, 2;	or 1 in 4;	or 25·0 per cent.
Leg	„ 9;	„ 0		
Arm	„ 6;	„ 1;	or 1 in 6;	or 16·6 „
Forearm	„ 11;	„ 1;	or 1 in 11;	or 9·1 „

Total cases 34; deaths, 4; or 1 in 8·5; or 11·7 per cent.



*Secondary or for Disease.*

Thigh	cases, 21; deaths, 3; or 1 in 7; or 14·3 per cent.
Leg	„ 21; „ 2; or 1 in 10·5; or 9·5 „
Arm	„ 2 } no deaths.
Forearm	„ 4 }

---

Total cases, 48; deaths, 5; or 1 in 9·6; or 10·4 per cent.

Seeing that limb-amputations are fatal in rural and provincial private practice in the proportion of 1 in 9, or less, let us next inquire what, on the contrary, is their death-rate in large and metropolitan hospitals.

#### CHAPTER X.—MORTALITY OF THE FOUR AMPUTATIONS OF THE THIGH, LEG, ARM, AND FOREARM, IN LARGE AND METROPOLITAN HOSPITALS.

Formerly, when writing of the relative mortality of the four major amputations of the limbs in rural practice and in hospital practice, I ventured to lay it down as a proposition, that these amputations were about three times more fatal in our large and metropolitan hospitals than they were in the country; for while they were fatal in country and provincial private practice in the proportion of 1 in every 9 operated upon, they were fatal in the large hospitals of Edinburgh, Glasgow, and London, in the proportion of 1 in every 3 operated upon. (See *Medical Gazette* for January 16, 1869.)

To elucidate this important proposition, we shall therefore now investigate the mortality of these four amputations in the largest hospitals in Great Britain; and in doing so I shall use, as far as I have been able to procure them, the latest returns from these institutions. Our seven largest hospitals in this country are the Royal Infirmaries of Edinburgh and Glasgow; and in London, Guy's, St Bartholomew's, St George's, the London, and the Middlesex Hospitals. Each of these institutions has upwards of 300 beds; most of them about 500. St Thomas's Hospital when rebuilt will, I believe, be still larger. At present, in its temporary quarters, it has only about 200 beds. As the problem refers to metropolitan hospitals, we shall include the statistics of other smaller London hospitals, as King's College, St Mary's, the Westminster, the Royal Free Hospital, etc.

As the whole of the present inquiry has originated in questions connected with the rebuilding of the Edinburgh Hospital, let us begin with it.

## I.—ROYAL INFIRMARY OF EDINBURGH.

This hospital contains 519 beds.<sup>1</sup> The mortality in its amputation cases has, at different and distant dates, been published by Dr Monro, Dr Reid, Dr Peacock, and others. Dr Fenwick of London, when writing on the mortality of amputations in 1848, states the number of cases of the major amputations performed in the Edinburgh Infirmary for  $3\frac{1}{2}$  years to be slightly more than 1 in every 2 (or more correctly 1 in 1·96). For the following Table of its amputation statistics during the last eight years, I am indebted to Mr M'Dougall, the highly esteemed Superintendent of the hospital, who drew it up with the permission of the Managers :—

TABLE IV.—*Result of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in the Royal Infirmary, Edinburgh, from 1859 to 1868 inclusive.*<sup>2</sup>

Year.	For Injury.								For Disease.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
1859-60	3	3	7	1	0	0	0	0	13	1	0	0	0	0	1	0
1860-61	4	3	5	1	3	1	4	0	9	1	3	0	1	0	0	0
1861-62	10	7	7	5	2	0	3	0	19	3	2	0	1	0	2	0
1862-63	4	4	10	5	1	0	7	0	12	6	5	1	1	1	2	1
1863-64	6	3	6	3	3	3	2	0	21	10	5	3	2	0	5	2
1864-65	5	5	3	2	3	1	7	2	14	4	3	2	1	1	5	4
1865-66	12	8	5	4	4	3	3	1	11	3	5	1	0	0	2	0
1866-67	10	9	8	3	4	3	8	1	14	10	1	0	1	1	1	0
1867-68	11	6	7	5	1	1	5	1	21	10	4	2	0	0	1	0
Total,	65	48	58	29	21	12	39	5	134	48	28	9	7	3	19	7
Mortality per cent.	73·8		50·0		57·1		12·8		35·8		32·1		42·8		36·8	
Or proportionally 1 in	1·3		2·0		1·7		7·8		2·8		3·1		2·3		2·7	

Total number of cases, 371; of deaths, 161; or 1 in every 2·3 died, or 43·3 in every 100.

Total number of amputations for injury, 183; deaths, 94; or 1 in every 2·0 died, or 51·3 in every 100.

Total number of amputations for disease, 188; deaths, 67; or 1 in every 2·8, or 35·6 in every 100.

If we combine together the amputations for injury and for disease,

<sup>1</sup> In these figures relative to the number of beds in different hospitals, I have chiefly followed the excellent official report of Dr Bristowe and Mr Holmes (see Sixth Report of the Medical Officer of the Privy Council), and Mr Churchill's Medical Directory.

<sup>2</sup> Ten fatal double amputations through the continuity of the bones alluded to previously in Chapter III. are not included.

the mortality from the different individual amputations during the above period in the Edinburgh Infirmary was as follows:—

*Mortality of the Individual Amputations.*

Thigh	cases, 199;	deaths, 96;	or 1 in 2·1;	or 47·2 per cent.
Leg	„ 86;	„ 38;	or 1 in 2·2;	or 44·2 „
Arm	„ 28;	„ 15;	or 1 in 1·8;	or 53·6 „
Forearm	„ 58;	„ 12;	or 1 in 4·8;	or 20·7 „

II. ROYAL INFIRMARY OF GLASGOW.

This great institution contains from 500 to 600 beds. The statistics of the amputations in the Glasgow Royal Infirmary at different periods have been published by Drs Lawrie, Steele, M'Ghie, Watson, and others. The following Table includes the statistics of the limb-amputations in the hospital from 1850 to 1868. These returns are taken from the published yearly reports of the hospital, for access to a collection of which I am indebted to the excellent Registrar of the hospital, Dr Thomas:—

TABLE V.—*Result of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in the Royal Infirmary, Glasgow, from 1847 to 1868 inclusive.*

Year.	For Injury.								For Disease.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
1850	1	1	3	1	2	1	5	0	5	4	7	4	2	1	0	0
1851	1	0	1	0	0	0	1	0	6	5	8	3	0	0	0	0
1852	0	0	1	0	2	0	5	0	5	2	6	3	1	0	4	1
1853	0	0	4	1	7	1	2	0	16	7	10	4	5	2	2	0
1854	0	0	4	2	3	3	1	0	10	7	5	0	4	1	3	0
1855	3	1	2	2	2	1	2	0	5	3	10	1	0	0	1	0
1856	2	2	4	1	2	2	2	1	11	5	1	0	0	0	0	0
1857	4	3	5	3	2	1	3	2	8	2	1	1	1	0	0	0
1858	4	2	5	4	1	0	4	1	8	5	3	1	0	0	2	0
1859	5	4	7	5	6	2	5	0	7	1	2	0	0	0	0	0
1860	3	0	4	3	9	1	4	0	8	2	3	2	3	0	0	0
1861	7	4	9	6	3	2	6	2	14	7	6	3	2	1	2	0
1862	12	4	9	2	6	2	3	0	7	0	2	0	3	0	1	0
1863	13	10	3	1	6	2	5	1	14	4	3	0	0	0	0	0
1864	7	4	9	3	9	2	8	2	9	3	4	1	1	1	0	0
1865	8	6	7	6	14	2	6	0	12	4	1	0	0	0	0	0
1866	18	12	7	4	12	6	2	0	4	1	5	3	0	0	3	0
1867	3	1	8	5	6	5	2	0	13	2	3	0	0	0	0	0
1868	9	6	1	1	9	5	0	0	15	4	2	1	1	0	1	0
Total,	100	60	93	50	101	38	66	9	177	68	82	27	23	6	19	1
Mortality per cent.	60·0		53·7		37·6		13·6		38·4		32·9		26·0		5·2	
Or 1 in	1·6		1·8		2·6		7·3		2·6		3·0		3·8		19·0	

Total number of cases, 661; of deaths, 259. Hence 1 in every 2·5 died, or 39·1 in every 100.

Total number of amputations for injury, 360; deaths, 157; or 1 in every 2·3 died, or 43·6 in every 100.

Total number of amputations for disease, 301; deaths, 102; or 1 in every 2·9 died, or 33·8 in every 100.

*Mortality of the Four Major Amputations, combining together Operations for Injuries and Operations for Diseases.*

Thigh	cases, 277;	deaths, 128;	or 1 in 2·1;	or 46·2 per cent.
Leg	„ 175;	„ 77;	or 1 in 2·2;	or 44·0 „
Arm	„ 124;	„ 44;	or 1 in 2·8;	or 35·4 „
Forearm	„ 85;	„ 10;	or 1 in 8·5;	or 11·7 „

III. ST BARTHOLOMEW'S HOSPITAL, LONDON.

Of the London hospitals, this is the oldest in its foundation, and has always been held in high esteem. It contains 650 beds. I am obliged to Mr Alfred Willett, the Surgical Registrar to the hospital, for copies of the official statistical reports, and for the following Table of the limb-amputations performed there since 1863, with their results.

TABLE VI.—*Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in St Bartholomew's Hospital, London, from 1863 to 1868 inclusive.*

Year.	For Injury.								For Disease.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
1863	7	5	10	4	3	1	4	2	22	10	5	0	1	0	1	0
1864	4	3	7	5	10	3	3	0	21	8	10	4	1	0	3	0
1865	7	3	4	4	2	0	5	0	14	7	14	6	5	0	3	0
1866	4	2	6	1	3	0	2	0	5	1	3	2	2	0	1	0
1867	2	1	4	1	1	0	2	0	9	4	2	1	3	0	1	0
1868	1	1	8	6	2	0	7	1	13	7	10	3	3	0	2	0
Total,	25	15	39	21	21	4	23	3	84	37	44	16	15	0	11	0
Mortality per cent.	60·0		54·0		19		13·0		44·0		36·3					
Or proportionally 1 in	1·6		1·8		5·2		7·6		2·2		2·7					

Total number of cases, 262; of deaths, 96; or 1 in every 2·7, or 36·6 in every 100.

Total number of amputations for injury, 108; of deaths, 43; or 1 in every 2·5, or 40 in every 100.



Total number of amputations for disease, 154; of deaths, 53; or 1 in every 2·9, or 34·4 in every 100.

If we combine together the amputations for injury and for disease, the mortality from the individual amputations during the above period in St Bartholomew's Hospital is as follows:—

*Mortality from the Individual Amputations.*

Thigh cases,	109 ;	deaths,	52 ;	or 1 in	2·1,	or 47·7 per cent.
Leg	„	83 ;	„	37 ;	or 1 in	2·2, or 44·5 „
Arm	„	36 ;	„	4 ;	or 1 in	9, or 11·1 „
Forearm	„	34 ;	„	3 ;	or 1 in	11, or 8·8 „

IV. THE LONDON HOSPITAL, WHITECHAPEL.

The London Hospital is, according to Dr Bristowe and Mr Holmes, “the greatest surgical institution in the metropolis.” It contains 500 beds, of which 350 are devoted to surgical cases. For the amputation returns for the year 1862 I am indebted to the report of Dr Bristowe and Mr Holmes; and for the years 1863, 4, 5, and 6 to the summaries given in the four published volumes of the “Clinical Lectures and Reports” of the Hospital. Those of the last two years, 1867–8, have been furnished me by Mr Jonathan Hutchison, Surgeon to the Hospital, and Lecturer on Surgery at its Medical School.

TABLE VII.—*Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in the London Hospital, from 1862 to 1868 inclusive.*

Year.	For Injury.								For Disease.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
1862	4	2	14	9	7	5	0	0	9	3	1	1	1	0	0	0
1863	4	4	7	5	6	3	0	0	5	1	5	0	0	0	3	0
1864	9	8	5	5	5	3	3	0	7	3	4	2	0	0	1	1
1865	9	7	7	6	4	1	0	0	11	6	3	2	0	0	0	0
1866	5	2	4	3	6	2	3	0	9	4	2	2	0	0	0	0
1867	3	3	7	2	2	1	2	0	15	4	3	1	1	0	0	0
1868	4	2	1	0	1	0	2	0	12	2	4	1	3	0	1	0
Total,	38	28	45	30	31	15	10	0	68	23	22	9	5	0	5	1
Mortality per cent.	73·6		66·6		48·4				33·8		41				20	
Or proportionally 1 in	1·3		1·5		2				2·9		2·4				5	

Total number of cases, 224; of deaths, 106; or 1 in every 2·1, or 47·3 in every 100.



Total number of amputations for injury, 124 ; of deaths, 73 ; or 1 in every 1·7, or 58·8 in every 100.

Total number of amputations for disease, 100 ; of deaths, 33 ; or 1 in every 3, or 33 in every 100.

If we combine together the amputations for injury and for disease, the mortality from the individual amputations in the London Hospital is as follows :—

*Mortality of Individual Amputations.*

Thigh	cases, 106 ;	deaths, 51 ;	or 1 in 2·0 ;	or 48·1 per cent.
Leg	„ 67 ;	„ 39 ;	or 1 in 1·7 ;	or 58·2 „
Arm	„ 36 ;	„ 15 ;	or 1 in 2·4 ;	or 41·6 „
Forearm	„ 15 ;	„ 1 ;	or 1 in 15 ;	or 6·6 „

V. GUY'S HOSPITAL, LONDON.

This institution can make up 580 beds. My friend, Dr Steele, the very able Superintendent of the hospital, has for many years past kept up, among other things, its Statistical Register with most exemplary care and accuracy. I am under obligations to him for the data in the following Table :—

TABLE VIII.—*Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in Guy's Hospital, London, from 1861 to 1868 inclusive.*

Year.	For Injury.								For Disease.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
1861	6	2	2	0	6	2	0	0	8	2	6	0	1	1	3	1
1862	7	3	8	4	1	0	4	0	7	4	6	1	2	0	0	0
1863	7	4	4	3	3	0	0	0	12	4	10	2	1	0	0	0
1864	5	4	11	6	1	1	1	1	11	4	4	1	1	1	0	0
1865	7	5	12	6	4	2	1	1	7	4	6	1	3	1	2	1
1866	4	2	8	6	5	2	3	1	10	1	6	1	1	1	1	0
1867	5	4	8	2	9	3	2	1	14	5	9	3	3	1	1	0
1868	5	2	0	0	2	2	4	2	14	3	2	0	1	0	1	0
Total,	46	26	53	27	31	12	15	6	83	27	49	9	13	5	8	2
Mortality per cent.	56·5		51		38·7		40		32·5		18		38·4		25	
Or proportionally 1 in	1·8		1·9		2·6		2·5		3		5·4		2·6		4	

Total number of cases, 298 ; of deaths, 114 ; or 1 in every 2·6, or 38·2 in every 100.

Total number of amputations for injury, 145 ; of deaths, 71 ; or 1 in every 2, or 49 in every 100.

Total number of amputations for disease, 153; of deaths, 43; or 1 in every 3·5, or 28 in every 100.

If we combine together the amputations for injury and for disease, the mortality from the individual amputations in Guy's Hospital is as follows:—

*Mortality of the Individual Amputations.*

Thigh	cases, 129; deaths, 53; or 1 in 2·4; or 41·0 per cent.
Leg	„ 102; „ 36; or 1 in 2·8; or 35·3 „
Arm	„ 44; „ 17; or 1 in 2·6; or 38·6 „
Forearm	„ 23; „ 8; or 1 in 2·8; or 34·7 „

VI. ST GEORGE'S HOSPITAL, LONDON.

This hospital contains 350 beds; 200 of which are set aside for surgical cases. Like all the large London hospitals, the edifice consists of four flats or stories. For the following data, in regard to the limb-amputations performed in St George's during the last five years, I stand indebted to the kindness of Mr Leigh, Registrar to the hospital.

TABLE IX.—*Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in St George's Hospital, London, from 1864 to 1868.*

Year.	For Injury.								For Disease.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
1864	1	0	4	0	0	0	1	0	7	2	7	2	0	0	2	0
1865	0	0	0	0	4	2	1	0	12	4	7	2	4	0	0	0
1866	3	2	0	0	0	0	0	0	13	7	13	3	1	1	0	0
1867	0	0	1	0	1	0	0	0	11	7	8	2	2	2	1	0
1868	1	1	3	2	2	2	0	0	11	5	1	1	1	1	3	1
Total,	5	3	8	2	7	4	2	0	54	25	36	10	8	4	6	1
Mortality per cent.	60		25		57				46·3		27·7		50		16·6	
Or proportionally 1 in	1·6		4		1·8				2·1		3·6		2		6	

Total number of cases, 126; of deaths, 49; or 1 in every 2·5, or 38·8 in every 100.

Total number of amputations for injury, 22; of deaths, 9; or 1 in every 2·4, or 41 in every 100.

Total number of amputations for disease, 104; of deaths, 40; or 1 in every 2·6, or 38·4 in every 100.

If we combine together the amputations for injury and for dis-

ease, the mortality from the individual amputations in St George's Hospital is as follows:—

*Mortality of the Individual Amputations.*

Thigh	cases, 59; deaths, 28; or 1 in 2·1; or 47·4 per cent.
Leg	„ 44; „ 12; or 1 in 3·6; or 27·2 „
Arm	„ 15; „ 8; or 1 in 1·8; or 53·3 „
Forearm	„ 8; „ 1; or 1 in 8; or 12·5 „

VII. RESULTS OF LIMB-AMPUTATIONS IN NINE METROPOLITAN HOSPITALS.

I have been kindly furnished by Mr Arnott, Mr Bell, Mr Murphy, Mr Holt, and Dr Black, with the amputation statistics of five other London hospitals, in addition to those of the four chief metropolitan hospitals adduced in the four preceding Tables. But as these five hospitals are all smaller, and hence their returns not so important, nor in some respects so complete or continuous, it is unnecessary perhaps to print them at length. In the succeeding Table, therefore, I will take the liberty of conjoining them and the four preceding hospital returns—so as thus to have a general and connected view of the mortality attendant upon limb-amputations in these nine metropolitan hospitals, taken either individually or as a whole.

TABLE X.—*Latest Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in Nine London Hospitals.*

Name of Hospital.	Years of Observation.	For Injury.								For Disease.							
		THIGH.		LEG.		ARM.		FORE-ARM.		THIGH.		LEG.		ARM.		FORE-ARM.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
St Bartholomew's	1863-68	25	15	39	21	21	4	23	3	84	37	44	16	15	0	11	0
St George's	1864-68	5	3	8	2	7	4	2	0	54	25	36	10	8	4	6	1
Guy's	1861-68	44	26	53	27	30	12	15	6	83	27	49	9	13	5	5	2
London	1862-68	38	28	45	30	31	15	10	0	68	23	22	9	5	0	5	1
Middlesex	1867-68	1	0	4	3	1	1	0	0	0	0	0	0	1	1	1	1
King's College	1863-68	1	1	1	1	0	0	1	0	14	5	5	1	1	1	4	2
Royal Free	1862-68	9	6	23	15	6	2	8	1	6	1	2	0	1	1	1	0
Westminster	1861-67	14	9	5	3	0	0	0	0	5	4	14	7	4	1	3	0
St Mary's	1868	2	0	1	0	1	0	5	1	6	1	1	1	0	0	1	0
Total		139	88	179	102	97	38	64	11	320	123	173	53	48	13	37	7
Mortality per cent.		63·3		57		39·1		17·1		38·4		35·7		27·0		18·9	
Or proportionally 1 in		1·6		1·7		2·5		5·8		2·6		3·2		3·7		5·2	

Total number of cases, 1057; of deaths, 435; or 1 in every 2·4 died, or 41·1 in every 100.

Total number of amputations for injury, 479; deaths, 239; or 1 in every 2·0 died, or 50 in every 100.

Total number of amputations for disease, 578; deaths, 196; or 1 in every 2·9 died, or 33·9 in every 100.

If we combine together the amputations for injury and for disease, the mortality from the individual amputations in the above-mentioned London hospitals was as follows:—

*Mortality of the Individual Amputations.*

Thigh	cases, 459;	deaths, 211;	or 1 in 2·1;	or 46·0 per cent.
Leg	„ 352;	„ 155;	or 1 in 2·2;	or 44·0 „
Arm	„ 145;	„ 51;	or 1 in 2·8;	or 35·1 „
Forearm	„ 101;	„ 18;	or 1 in 5·5;	or 17·8 „

VIII. ELEVEN LARGE AND METROPOLITAN BRITISH HOSPITALS.

If we throw together into one table the data spread over the preceding seven tables, including together the amputation statistics of the Edinburgh and Glasgow Infirmarys, and of nine of the leading London Hospitals, the result is as follows:—

TABLE XI.—*Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in Eleven Large and Metropolitan Hospitals; all amputations through the joints being excluded.*

Hospitals.	For Injury.								For Disease.							
	Thigh.		Leg.		Arm.		Fore-arm.		Thigh.		Leg.		Arm.		Fore-arm.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Edinburgh Infirmary	65	48	58	29	21	12	39	5	134	48	28	9	7	3	19	7
Glasgow Infirmary .	100	60	93	50	101	38	66	9	177	68	82	27	23	6	19	1
Nine Metropolitan Hospitals . . .	139	88	179	102	97	38	64	11	320	123	173	53	48	13	37	7
Total . .	304	196	330	181	219	88	169	25	631	239	283	89	78	22	75	15
Mortality per cent. .	64·4		54·8		40·1		14·8		37·8		31·4		28·2		20	
Or proportionally 1 in	1·5		1·8		2·5		6·7		2·6		3·2		3·5		5	

Total number of cases, 2089; of deaths, 855; or 1 in 2·4, or 41 per cent.

Total number of amputations for injury, 1022; of deaths, 490; or 1 in 2·1, or 48 per cent.

Total number of amputations for disease, 1067; of deaths, 365; or 1 in 2·9, or 34·2 per cent.



*Mortality of Individual Amputations.*

Thigh	cases, 935 ; deaths, 435 ; or 1 in 2·1, or 46·5 per cent.
Leg	„ 613 ; „ 270 ; or 1 in 2·2, or 44·0 „
Arm	„ 297 ; „ 110 ; or 1 in 2·7, or 37·0 „
Forearm	„ 244 ; „ 40 ; or 1 in 6·0, or 16·4 „

*Mortality from the Amputations for Injury in the Edinburgh and Glasgow Infirmaries, and in Nine London Hospitals.*

Thigh	cases, 304 ; deaths, 196 ; or 1 in 1·5, or 64·4 per cent.
Leg	„ 330 ; „ 181 ; or 1 in 1·8, or 54·8 „
Arm	„ 219 ; „ 88 ; or 1 in 2·3, or 40·1 „
Forearm	„ 169 ; „ 25 ; or 1 in 6·7, or 14·7 „

*Mortality from the Amputations for Disease in the same Hospitals.*

Thigh	cases, 631 ; deaths, 239 ; or 1 in 2·6, or 37·8 per cent.
Leg	„ 283 ; „ 89 ; or 1 in 3·1, or 31·4 „
Arm	„ 78 ; „ 22 ; or 1 in 3·5, or 28·2 „
Forearm	„ 75 ; „ 15 ; or 1 in 5·0, or 20·0 „

## CHAPTER XI.—THE PROPORTIONATE DEATH-RATE AND THE EXCESS OF MORTALITY OF LIMB-AMPUTATIONS IN LARGE AND METROPOLITAN HOSPITALS, AS COMPARED WITH COUNTRY PRACTICE.

The total number of limb-amputations collected from private country and provincial practice contained in Table I. amounts to 2098. On counting up the limb-amputations collected from eleven large and metropolitan hospitals, and contained in Table XI., the total number happens accidentally to be very nearly the same, for it amounts to 2089.

The whole collected number operated upon is thus nearly similar in hospital practice and in rural practice. But the results as to the relative number of lives lost in these two types or places of practice is immensely different.

After the 2098 limb-amputations in the country, 226 of the patients died. After the 2089 limb-amputations in eleven large and metropolitan hospitals, 855 of the patients died.

The mortality after limb-amputations in the country is thus 1 in 9·2 (see Chapter II.), and after limb-amputations in large and metropolitan hospitals 1 in 2·4 (see Chapter X.). Hence the number that die after these operations is in such hospital practice, when compared with rural practice, nearly FOUR TIMES GREATER.

But the experienced country surgeon loses—as we have seen in Chapter VIII.—only 1 in every 12·4 of his patients upon whom he performs limb-amputation. Hence the experienced country surgeon operating upon his patients in poor cottages and villages is—as com-

pared with the experienced city surgeon, operating upon his patients in rich and magnificent hospitals—FIVE TIMES MORE SUCCESSFUL.

In some minor amputations—and hence, I believe, in other minor operations also—the contrast is still more marked between the success of amputation in country practice and in the practice of large hospitals. In country practice, after amputation of the forearm, 2 died out of 377 cases, or 1 in every 188 operated on. In eleven large and metropolitan hospitals, out of 244 cases of amputation of the forearm, 40 died, or 1 in every 6 operated on. Hence, according to these data, the death-rate in hospital practice was, as compared with the death-rate in rural practice in this individual operation, THIRTY TIMES GREATER.

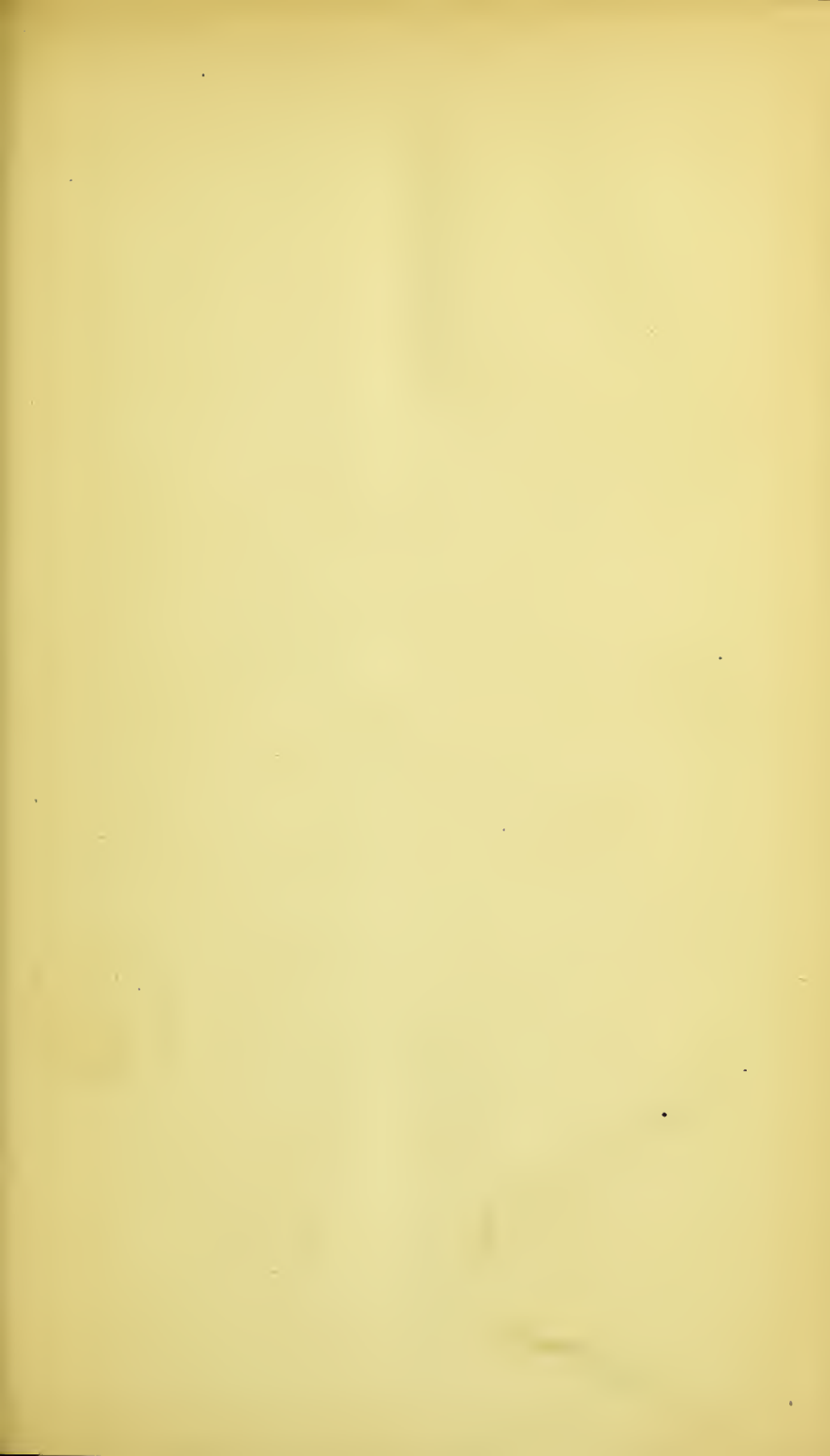
The tremendous differences between the two practices may, perhaps, be more pointedly and simply stated thus:—

Out of **2089** amputations in hospital practice, **855** died ;

Out of **2098** amputations in country practice, **226** died ;

*Giving an excess to hospital practice of 629 deaths.*

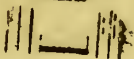
This excess, in about 2100 limb-amputations, of 629 deaths in hospital practice as compared with rural practice—in our palatial hospitals as compared with our rural villages and cottages—in large wards as compared with isolated rooms—is certainly much greater and more pronounced than I myself expected when I began the present inquiry. But must the calling of this dismal death-roll still go on unchallenged and unchecked? Shall this pitiless and deliberate sacrifice of human life to conditions which are more or less preventable, be continued or arrested? Do not these terrible figures plead eloquently and clamantly for a revision and reform of our existing hospital system?





D

Chadwick



Leeds